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## Regulatory frameworks can support the development of aquaculture

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### *Abstract*

Establishing new **mariculture** activities is **difficult** in many European countries. **This** is partly caused by lack of understanding of the actual environmental impact of the industry and lack of appropriate **regulatory frameworks**.

Regulations that can overcome these obstacles must be efficient, coherent and transparent. **This** will safeguard the environment and also provide stable long-term conditions for the **industry**, which **will** also get the necessary legitimacy and credibility.

The regulations must form a coherent and unbroken chain of logical and adequate elements; political support, EQO and EQS, management systems that can and keep the environmental impact of the **farms** in accordance with the EQO.

The scientists must provide the information required to develop the regulations, but are also responsible for bringing the information to the debate forum and the decision makers.

## Introduction

European countries enjoy good conditions for the development of a viable **aquaculture** industry. High-quality water resources are normally plentiful; high educational and technical standards provide a solid basis for sophisticated development, and there is a large market with adequate purchasing power for healthy and trendy seafood. Furthermore, aquaculture is a highly efficient means of intensive animal food production, which offers a higher yield and lower emissions of nutrients and organic waste than other methods of production (Åsgård & Austreng 1995). However, with a few exceptions; the development of the aquaculture industry in most European countries is slow or stagnant. One reason for this may be exaggerated belief about the actual or potential environmental impact of aquaculture, belief that is often shared by the public and the authorities. Another barrier to aquaculture development may be the lack of appropriate legislation and regulations; those that do exist have **often** been designed for other purposes and are often fragmentary where the regulation of aquaculture is concerned.

The establishment of coherent regulatory frameworks capable of ensuring that the aquaculture industry is operating in an environmentally acceptable way is one way of overcoming these obstacles. Such regulations would also enable the aquaculture sector to participate as a **full** partner in Coastal Zone Management, which is of growing importance as a means of ensuring the widest access to coastal resources.

Adequate scientific information is a prerequisite for the development of a regulatory framework for aquaculture, but scientists also need participate in the process of developing the framework itself. This often represents a challenge, as the process lies beyond most scientists' particular fields of expertise.

This paper offers some points of view on regulatory frameworks for controlling the environmental impact of aquaculture and on the process of establishing them. Certain aspects of the current Norwegian regulatory framework are used for purposes of illustration.

## The process of developing adequate regulatory systems

Well-designed regulations provide long-term, predictable regulatory frameworks for industry. Such regulations safeguard a range of economic and practical parameters, and by controlling industrial activity protects both the environment and public interests. In our pluralistic European societies it is crucial that the very process of establishing the regulatory framework, as well as the **framework** itself, should be open and transparent, so that all interested parties

can participate in the process and check its progress, This is essential if the framework, as well as the activity which it regulates, is to acquire the necessary credibility and public trust.

The process of establishing regulations for aquaculture involves a wide range of interests and stakeholders, all with different knowledge and backgrounds. The debate may therefore be tense. The very debate, however, is a crucial part of the process of developing and gaining recognition of and consensus for the regulations. In this context the scientists must provide the information and answer the questions that are needed to develop the regulatory systems. If such information is lacking, the precautionary principle must be applied, and the aquaculture activity will be turned down. As well as obtaining the appropriate information, scientists are responsible for ensuring that it is brought into the debating forum. It is not sufficient to publish the results in scientific journals; the scientist must see that the results are actually utilised by the end users.

### **The coherence of the regulatory framework**

To acquire and maintain legitimacy a functional regulatory framework must form a coherent and unbroken sequence of logical and adequate elements (GESAMP 1996). These elements ideally consist of political support for aquaculture, environmental quality objectives and standards, a methodology for environmental impact assessment, adequate monitoring programmes and administrative measures in case the farming activity leads to unacceptable effects.

For the scientist the coherence of the framework is most important as this provides the necessary guidelines for developing both environmental quality standards and monitoring programmes. Without such support and participation in a team, the work of the scientists may well be left isolated, with little authority or influence.

### **The elements of the regulatory framework**

#### **Political support**

Any aquaculture activity is dependent on the existence of various socio-economic elements as well as access to natural resources such as water and suitable sites, where participation in coastal zone planning is usually a prerequisite. Aquaculture is thus dependent on active political support, and in cases where the authorities are indifferent or antagonistic, aquaculture has poor chances for development (Ackefors 1996).

The overriding objective of Norwegian aquaculture policy is that aquaculture shall be a balanced and sustainable, profitable and viable regional industry (Anon., 1995). As far as the

environment is concerned, management of the aquaculture industry attempts to obtain a balance between the utilisation and protection of water and biological resources, both out of concern for the environment and as a basis for the production of high-quality seafood. The stated objective of aquaculture research is to generate information that can help to open up new opportunities for industrial development, to help the industry and the public sector to reach decisions and to help produce efficient solutions to existing and future problems.

#### Environmental quality objectives (EQO) and environmental quality standards (EQS)

Long- and short-term environmental quality objectives for the Norwegian aquaculture industry have been drawn up and are revised at regular intervals (Anon. 1993, Ervik et al. 1995, Anon 1999). The **EQOs** are largely based on scientific information, and represent the joint viewpoints of the various sectors of the environmental authorities. Five areas of concern are given priority as follows: escapes of farmed salmon, diseases, medicines, chemical and organic effluents. The objectives emphasise the values of the national pollution control agency, and less attention is paid to the ecological impact of aquaculture.

While the environmental objectives may be rather general, the environmental quality standards (**EQS**) which are derived from them should preferably be quite precise and be linked to measurable parameters (GESAMP 1996). The EQS can thus be used to define an acceptable level of environmental impact. The setting of objective limits for allowable impact is crucial.

#### The management system

The management system must ensure that the environmental impact of aquaculture activities does not breach the EQO or EQS. For this reason it must be able to simulate as well as monitor the impact. For Norwegian conditions a system has been developed that can be used to adapt the local environmental impact to the holding capacity of the site (Ervik and Hansen, 1994, Ervik et al., 1997). The system is called MOM (Modelling-Ongrowing fish **farms**-Monitoring). It is based on the concept of integrating the elements of environmental quality assessment and the monitoring of environmental impact with its associated EQS into a single system. The amount of monitoring depends on the level of environmental impact.

#### Action if unacceptable impact

A well-designed monitoring programme should be able to reveal environmental deterioration at early stage so that unacceptable impact can be avoided. It is the responsibility of the

authorities to continuously check the results of the monitoring process and to react appropriately if the EQS is breached.

## Conclusions

An adequate regulatory framework can support the development of mariculture. Such a **framework** will provide the industry with predictable and stable long-term conditions, prevent unacceptable environmental impacts, ensure a good environment for production and raise the credibility of the industry. Good regulatory systems will also enable the aquaculture sector to participate in coastal zone planning.

The regulatory framework must be coherent and form an unbroken sequence of logical and adequate elements. It is also important that the process of developing the framework, as well as the framework itself, is open and transparent.

Environmental scientists are responsible for providing the necessary information, and for ensuring that the information is available in the process of developing the regulations.

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